

The documentation and process conversion measures necessary to comply with this document shall be completed by 17 March 2005.

INCH-POUND

MIL-PRF-19500/612B
17 December 2004
SUPERSEDING
MIL-PRF-19500/612A
28 December 1997

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, POWER,
TYPE 2N7372, JAN, JANTX, JANTXV, AND JANS

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

* The requirements for acquiring the product described herein shall consist of
this specification sheet and MIL-PRF-19500.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for PNP, silicon, power transistors for use in high-speed power switching applications. Four levels of product assurance are provided as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (TO-254AA).

* 1.3 Maximum ratings. Unless otherwise specified, $T_C = +25^\circ\text{C}$.

| Type | P_T (1) $T_A = +25^\circ\text{C}$ | P_T (2) $T_C = +25^\circ\text{C}$ | $R_{\theta JA}$ | $R_{\theta JC}$ | V_{CBO} | V_{CEO} | V_{EBO} | I_C | I_C (3) | T_J and T_{STG} |
|--------|--|--|--------------------------------------|--------------------------------------|-------------|-------------|-------------|-------------|--------------|------------------------------------|
| | <u>W</u> | <u>W</u> | <u>$^\circ\text{C/W}$</u> | <u>$^\circ\text{C/W}$</u> | <u>V dc</u> | <u>V dc</u> | <u>V dc</u> | <u>A dc</u> | <u>A dc</u> | <u>$^\circ\text{C}$</u> |
| 2N7372 | 4 | 58 | 40 | 3 | 100 | 80 | 5.5 | 5.0 | 10 | -65 to +200 |

- (1) Derate linearly 22.8 mW/ $^\circ\text{C}$ for $T_A > +25^\circ\text{C}$.
- (2) Derate linearly 331 mW/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$.
- (3) This value applies for $PW \leq 8.3$ ms, duty cycle ≤ 1 percent.

* Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dsc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil/>.

AMSC N/A

FSC 5961

- * 1.4 Primary electrical characteristics. Unless otherwise specified, $T_C = +25^\circ\text{C}$.

| | h_{FE2} | $ h_{fe} $ | $V_{BE(SAT)2}$ (1) | $V_{CE(SAT)2}$ (1) | C_{obo} | Reverse pulse (2) energy | Safe operating area |
|-----|---|--|---|---|---|--------------------------|---------------------|
| | $V_{CE} = 5.0 \text{ V dc}$ $I_C = 2.5 \text{ A dc}$ | $V_{CE} = 5.0 \text{ V dc}$ $I_C = 500 \text{ mA dc}$ $f = 10 \text{ MHz}$ | $I_C = 5.0 \text{ A dc}$ $I_B = 500 \text{ mA dc}$ | $I_C = 5.0 \text{ A dc}$ $I_B = 500 \text{ mA dc}$ | $V_{CB} = 10 \text{ V dc}$ $I_E = 0 \text{ A dc}$ $100\text{kHz} \leq f \leq 1\text{MHz}$ | | |
| Min | 70 | 7.0 | <u>V dc</u> | <u>V dc</u> | <u>pF</u> | <u>mJ</u> | See figure 2 |
| Max | 200 | | 2.2 | 1.5 | 250 | 15 | |

(1) Pulse (see 4.5.1)

(2) This rating is based on the capability of the transistors to operate safely in the unclamped inductive load energy test circuit of figure 3.

2. APPLICABLE DOCUMENTS

* 2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

* 2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

* DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

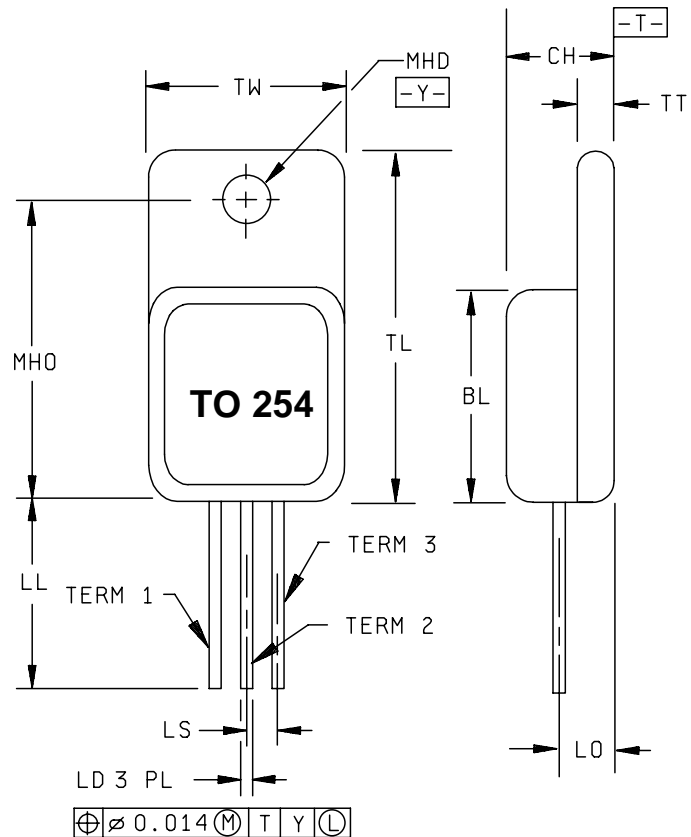
* DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-750 - Test Methods for Semiconductor Devices.

* (Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

* 2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

| Ltr | Dimensions | | | |
|--------|------------|------|-------------|-------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| BL | .535 | .545 | 13.59 | 13.84 |
| CH | .249 | .260 | 6.32 | 6.60 |
| LD | .035 | .045 | 0.89 | 1.14 |
| LL | .53 | .55 | 13.46 | 13.97 |
| LO | .150 BSC | | 3.81 BSC | |
| LS | .150 BSC | | 3.81 BSC | |
| MHD | .139 | .149 | 3.53 | 3.78 |
| MHO | .665 | .685 | 16.89 | 17.40 |
| TL | .790 | .800 | 20.07 | 20.32 |
| TT | .040 | .050 | 1.02 | 1.27 |
| TW | .535 | .545 | 13.59 | 13.84 |
| Term 1 | Base | | | |
| Term 2 | Collector | | | |
| Term 3 | Emitter | | | |



NOTES:

1. Dimensions are in inches.
- * 2. Millimeters are given for general information only.
3. All terminals are isolated from case.
4. In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.

* FIGURE 1. Dimensions and configuration (TO-254AA).

3. REQUIREMENTS

* 3.1 General. The individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

* 3.4 Interface requirements and physical dimensions. The interface requirements and physical dimensions shall be as specified on figure 1. Methods used for electrical isolation of the terminal feedthroughs shall employ materials that contain a minimum of 90 percent AL_2O_3 (ceramic). Examples of such construction techniques are metallized ceramic eyelets or ceramic walled packages.

* 3.4.1 Lead finish and formation. Lead finish shall be solderable in accordance with MIL-STD-750, MIL-PRF-19500, and herein. Where a choice of lead finish or formation is desired, it shall be specified in the acquisition requirements (see 6.2). When lead formation is performed, as a minimum, the vendor shall perform 100 percent hermetic seal in accordance with screen 14 of MIL-PRF-19500 and 100 percent dc testing in accordance with table I, subgroup 2 herein.

3.5 Marking. Marking shall be in accordance with MIL-PRF-19500.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.7 Electrical test requirements. The electrical test requirements shall be as specified in table I.

3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.2).

b. Screening (see 4.3)

* c. Conformance inspection (see 4.4 and table I).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500.

* 4.2.1 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of table II tests, the tests specified in table II herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

* 4.3 Screening (JANS, JANTX, and JANTXV levels only). Screening shall be in accordance with MIL-PRF-19500 (Appendix E, table IV), and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

| Screen (see table IV of MIL-PRF-19500) | Measurement | |
|--|--|---|
| | JANS level | JANTX and JANTXV levels |
| <u>1/</u> 3c | Thermal impedance (see 4.3.1) | Thermal impedance (see 4.3.1) |
| 7 | Optional. | Optional. |
| 9 | ICES1 and hFE2 | Not applicable |
| 11 | Subgroup 2 of table I herein; ICES1 and hFE2; ΔI_{CES1} = 100 percent of initial value or 100 nA dc whichever is greater. Δh_{FE2} = ± 20 percent of initial value. | ICES1 and hFE2 |
| 12 | See 4.3.2 | t = 80 hours minimum See 4.3.2 |
| 13 | Subgroups 2 and 3 of table I herein; ICES1 and hFE2; ΔI_{CES1} = 100 percent of initial value or 100 nA dc, whichever is greater. Δh_{FE2} = ± 20 percent of initial value. | Subgroup 2 of table I herein; ICES1 and hFE2; ΔI_{CES1} = 100 percent of initial value or 100 nA dc, whichever is greater. Δh_{FE2} = ± 20 percent of initial value. |
| 14 | Required. | Required. |

1/ May be performed anytime before screen 9.

* 4.3.1 Thermal impedance ($Z_{\theta JX}$ measurements). The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3131. The maximum limit (not to exceed the table I, subgroup 2 limit) for $Z_{\theta JX}$ in table IV, screening of MIL-PRF-19500 shall be derived by each vendor by means of statistical process control. When the process has exhibited control and capability, the capability data shall be used to establish the fixed screening limit. In addition to screening, once a fixed limit has been established, monitor all future sealing lots using a random five piece sample from each lot to be plotted on the applicable X bar R chart. If a lot exhibits an out of control condition, the entire lot shall be removed from the line and held for Engineering evaluation and disposition.

* 4.3.2 Power burn-in conditions. Power burn-in conditions are as follows: $T_J = 187.5 \pm 12.5^\circ\text{C}$, $V_{CE} = 30 \text{ V dc} \pm 10 \text{ V dc}$, $C T_A$ = room ambient as defined in the general requirements, 4.5 of MIL-STD-750.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with appendix E, table V of MIL-PRF-19500, and table I herein. The following test conditions shall be used for $Z_{\theta JX}$, end point measurements: $Z_{\theta JX} = 3.1^{\circ}\text{C/W}$.

- a. I_M 10 mA.
- b. V_{CE} measurement voltage 20 V (same as V_H).
- c. I_H collector heating current 1 A (minimum).
- d. V_H collector-emitter heating voltage 20 V (minimum).
- e. t_H heating time 100 ms.
- f. t_{MD} measurement delay time 50 μs to 80 μs .
- g. t_{SW} sample window time 10 μs (maximum).

* 4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, tables VIa (JANS) and VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Electrical measurements (end points) shall be in accordance with table I, subgroup 2 herein except $Z_{\theta JX}$ shall be performed after subgroup 2 and 3) only.

4.4.2.1 Group B inspection, appendix E, table VIa (JANS) of MIL-PRF-19500.

| | <u>Subgroup</u> | <u>Method</u> | <u>Condition</u> |
|---|-----------------|---------------|--|
| | B3 | 2037 | Test condition A. |
| * | B4 | 1037 | $V_{CB} = 10\text{ V dc minimum, 2,000 cycles.}$ |
| | B5 | 1027 | See 4.5.2. |
| | B6 | 3131 | See 4.5.4. |

* 4.4.2.2 Group B inspection, appendix E, table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500.

| <u>Subgroup</u> | <u>Method</u> | <u>Condition</u> |
|-----------------|---------------|---|
| * B3 | 1037 | $V_{CB} = 10$ V dc minimum, 2,000 cycles. |

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table VII of MIL-PRF-19500. Electrical measurements (end points) shall be in accordance with table I, subgroup 2 herein.

| <u>Subgroup</u> | <u>Method</u> | <u>Condition</u> |
|-----------------|---------------|--|
| C2 | 2036 | Tension: test condition A; weight 10 pounds \pm 5 ounces; time 15 seconds. Bend strength: test condition F; bending stress 2 pounds, time 15 seconds. |
| * C5 | 3131 | See 4.5.4. |
| * C6 | 1037 | $V_{CB} = 10$ V dc minimum, 6,000 cycles |

* 4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IX of MIL-PRF-19500 and as specified in table II herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.5 Method of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows:

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

* 4.5.2 Group B accelerated life test. This test shall be conducted using one of the two options listed herein (a and b) with the following conditions applying to all options: $V_{CB} = 20$ V minimum dc; $T_J = +275^\circ\text{C}$.

a. $P_T = 2.5$; P_T adjusted to give a lot average of $T_J = +275^\circ\text{C}$ with $T_A = +125^\circ\text{C} \pm 25^\circ\text{C}$.

b. $T_A = +25^\circ\text{C} \pm 3^\circ\text{C}$ with P_T adjusted to give a lot average of $T_J = +275^\circ\text{C}$.

4.5.3 Inspection conditions. Unless otherwise specified in MIL-PRF-19500 or herein, all inspections shall be conducted at a case temperature (T_C) of $+25^\circ\text{C} \pm 3^\circ\text{C}$.

* 4.5.4 Thermal resistance. Thermal resistance measurements shall be conducted in accordance with test method 3131 of MIL-STD-750. The following details shall apply:

- Collector current magnitude during power application shall be 2 A dc.
- Collector to emitter voltage magnitude shall be 10 V dc.
- Reference temperature measuring point shall be the case.
- Reference point temperature shall be $25^\circ\text{C} \leq T_R \leq 75^\circ\text{C}$ and recorded before the test is started.
- Mounting arrangement shall be with heat sink to header.
- Maximum limit of $R_{\theta JC}$ shall be 3.0°C/W .

* TABLE I. Group A inspection.

| Inspection 1/ | MIL-STD-750 | | Symbol | Limits | | Unit |
|--|-------------|---|-----------------|--------|------|-------|
| | Method | Conditions | | Min | Max | |
| <u>Subgroup 1</u> | | | | | | |
| Visual and mechanical examination | 2071 | | | | | |
| <u>Subgroup 2</u> | | | | | | |
| * Thermal impedance | 3131 | See 4.3.1 | $Z_{\theta JC}$ | | 3.1 | °C/W |
| * Collector to emitter breakdown voltage | 3011 | Bias condition D; $I_C = 100$ mA dc; $I_B = 0$; Pulsed (see 4.5.1) | $V_{(BR)CEO}$ | 80 | | V dc |
| Collector to emitter cutoff current | 3041 | Bias condition C; $V_{CE} = 60$ V dc; $V_{BE} = 0$ | I_{CES1} | | 1.0 | μA dc |
| Collector to emitter cutoff current | 3041 | Bias condition C; $V_{CE} = 100$ V dc; $V_{BE} = 0$ | I_{CES2} | | 1.0 | mA dc |
| Collector to emitter cutoff current | 3041 | Bias condition D; $V_{CE} = 40$ V dc; $I_B = 0$ | I_{CEO} | | 50 | μA dc |
| Emitter to base cutoff current | 3061 | Bias condition D; $V_{EB} = 4$ dc; $I_C = 0$ | I_{EBO1} | | 1.0 | μA dc |
| Emitter to base cutoff current | 3061 | Bias condition D; $V_{EB} = 5.5$ dc; $I_C = 0$ | I_{EBO2} | | 1.0 | mA dc |
| Forward-current transfer ratio | 3076 | $V_{CE} = 5.0$ V dc; $I_C = 50$ mA dc; pulsed (see 4.5.1) | h_{FE1} | 50 | | |
| * Forward-current transfer ratio | 3076 | $V_{CE} = 5.0$ V dc; $I_C = 2.5$ A dc; pulsed (see 4.5.1) | h_{FE2} | 70 | 200 | |
| Forward-current transfer ratio | 3076 | $V_{CE} = 5.0$ V dc; $I_C = 5.0$ A dc; pulsed (see 4.5.1) | h_{FE3} | 40 | | |
| Base to emitter non-saturated voltage | 3066 | Test condition B; $V_{CE} = 5.0$ V dc, $I_C = 2.5$ A dc, Pulsed (see 4.5.1) | V_{BE} | | 1.45 | V dc |
| Base to emitter saturated voltage | 3066 | Test condition A; $I_C = 2.5$ A dc $I_B = 250$ mA dc, pulsed (see 4.5.1) | $V_{BE(SAT)1}$ | | 1.45 | V dc |

See footnote at end of table.

* TABLE I. Group A inspection - Continued.

| Inspection <u>1/</u> | MIL-STD-750 | | Symbol | Limits | | Unit |
|---|-------------|---|-----------------------|--------|------|-------|
| | Method | Conditions | | Min | Max | |
| <u>Subgroup 2</u> - Continued | | | | | | |
| Base to emitter saturated voltage | 3066 | Test condition A; I _C = 5.0 A dc, I _B = 500 mA dc; Pulsed (see 4.5.1) | V _{BE(SAT)2} | | 2.2 | V dc |
| Collector to emitter saturated voltage | 3071 | I _C = 2.5 A dc; I _B = 250 mA dc; pulsed (see 4.5.1) | V _{CE(sat)1} | | 0.75 | V dc |
| Collector to emitter saturated voltage | 3071 | I _C = 5.0 A dc; I _B = 500 mA dc; pulsed (see 4.5.1) | V _{CE(sat)2} | | 1.5 | V dc |
| <u>Subgroup 3</u> | | | | | | |
| High-temperature operation: | | T _A = +150°C | | | | |
| Collector to emitter cutoff current | 3041 | Bias condition A; V _{CE} = 60 V dc; V _{BE(OFF)} = +2 V dc | I _{CEX} | | 500 | μA dc |
| Low-temperature operation: | | T _A = -55°C | | | | |
| Forward-current transfer ratio | 3076 | V _{CE} = 5.0 V dc; I _C = 2.5 A dc; I _C = 2.5 A dc | h _{FE4} | 25 | | |
| <u>Subgroup 4</u> | | | | | | |
| Common-emitter, small-signal short-circuit forward-current transfer ratio | 3206 | V _{CE} = 5 V dc; I _C = 100 mA dc; f = 1 kHz | h _{fe} | 50 | | |
| Magnitude of common emitter small-signal short-circuit forward-current transfer ratio | 3206 | V _{CE} = 5 V dc; I _C = 500 mA dc; f = 10 MHz | h _{fe} | 7 | | |
| * Open circuit output capacitance | 3236 | V _{CB} = 10 V dc; I _E = 0; 100 kHz ≤ f ≤ 1 MHz | C _{obo} | | 250 | pF |
| Switching time | | I _C = 5 A dc; I _{B1} = 500 mA dc | t _{on} | | 0.5 | μs |
| | | I _{B2} = -500 mA dc | t _s | | 1.4 | μs |
| | | V _{BE(off)} = 3.7 V dc | t _f | | 0.5 | μs |
| | | R _L = 6 Ω; (see figure 4) | t _{off} | | 1.5 | μs |
| * | | | | | | |

See footnote at end of table.

* TABLE I. Group A inspection - Continued.

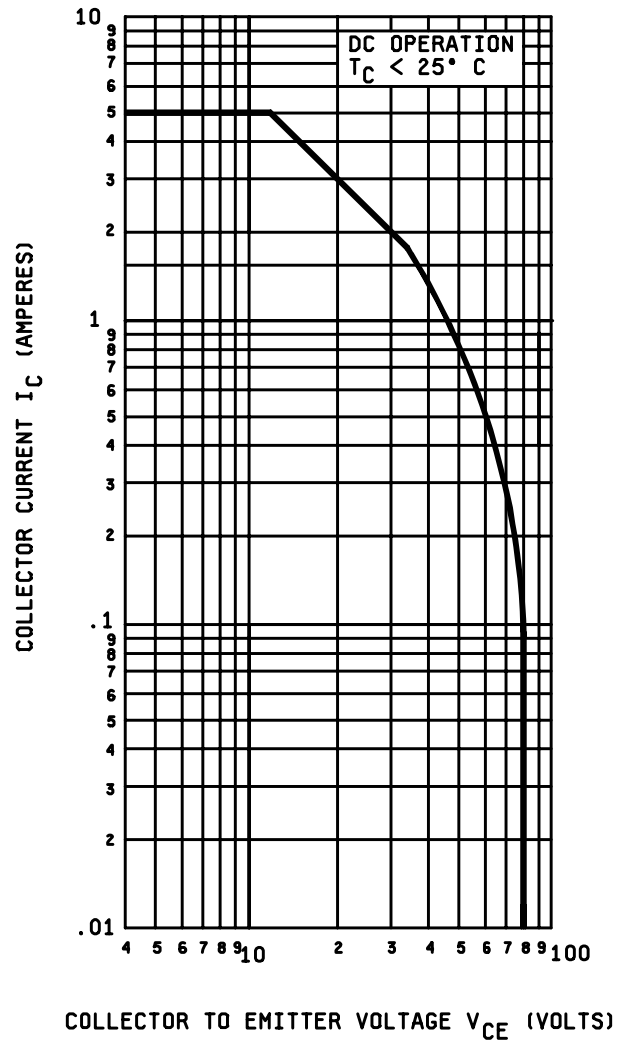
| Inspection <u>1/</u> | MIL-STD-750 | | Symbol | Limits | | Unit |
|--|-------------|--|--------|--------|-----|------|
| | Method | Conditions | | Min | Max | |
| <u>Subgroup 5</u> | | | | | | |
| Safe operating area (continuous dc) | 3055 | Pre pulse condition for each test: $V_{CE} = 0$, $I_C = 0$ $T_C = +25^\circ\text{C}$ Pulse condition for each test: $t_p = 1$ second, 1 cycle $T_C = +25^\circ\text{C}$ (see figure 2) | | | | |
| <u>Test 1</u> | | $V_{CE} = 12$ V dc, $I_C = 5$ A dc | | | | |
| <u>Test 2</u> | | $V_{CE} = 32$ V dc, $I_C = 1.5$ A dc | | | | |
| <u>Test 3</u> | | $V_{CE} = 80$ V dc, $I_C = 100$ mA dc | | | | |
| Safe operating area (unclamped inductive) | 3053 | $T_C = +25^\circ\text{C}$; $R_{BB1} = 10$ ohms; $R_{BB2} = 100$ ohms; $L = 0.3$ mH $R_L = 0.1$ ohms; $V_{CC} = 10$ V dc $V_{BB1} = 10$ V dc; $V_{BB2} = 4$ V dc $I_{CM} = 10$ A dc (see figure 3) | | | | |
| Electrical measurements | | Table I, subgroup 2 | | | | |
| <u>Subgroups 6 and 7</u> | | | | | | |
| Not applicable. | | | | | | |

1/ For sampling plan, see MIL-PRF-19500.

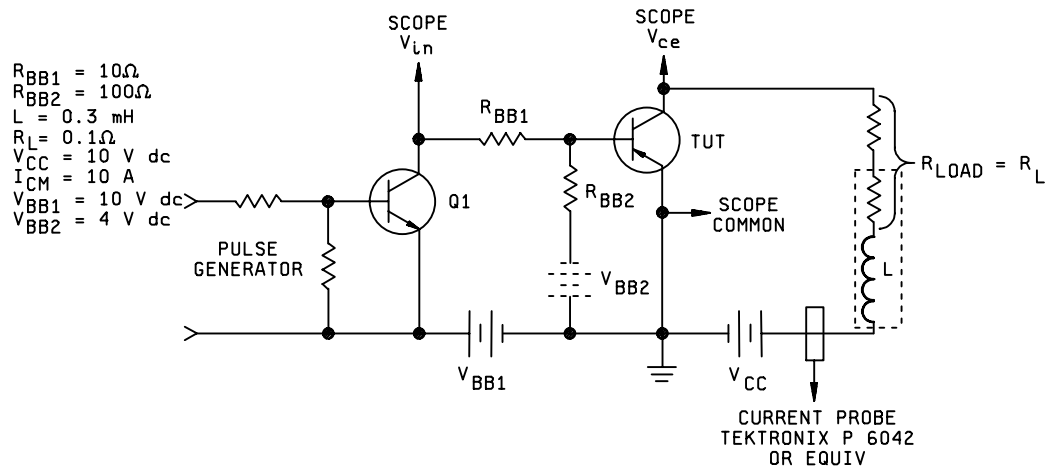
* TABLE II. Group E inspection (all quality levels) for qualification or re-qualification only.

| Inspection | MIL-STD-750 | | Qualification and large lot quality conformance inspection |
|--------------------------|-------------|--|--|
| | Method | Conditions | |
| <u>Subgroup 1</u> | | | 22 devices c = 0 |
| Temperature cycling | 1051 | 500 cycles | |
| Hermetic seal | 1071 | Test conditions G or H | |
| Fine leak | | Test conditions C or D | |
| Gross leak | | | |
| Electrical measurements | | Table I, subgroup 2 herein. | |
| <u>Subgroup 2 1/</u> | | | 22 devices c = 0 |
| Blocking life | 1048 | Test temperature = +125°C; $V_{CB} = 30$ V dc; T = 1000 hours; pre test measurements are table I, subgroup 2. | |
| Electrical measurements | | Table I, subgroup 2 herein (except for thermal impedance). | |
| <u>Subgroup 4</u> | | | Sample size N/A |
| Thermal impedance curves | | Each supplier shall submit their qual-lot average and design maximum thermal impedance curves to the qualifying activity. In addition, the optimal test conditions and Z_{0JX} limit shall be provided to the qualifying activity in the qualification report. | |
| <u>Subgroup 5</u> | | | |
| Not applicable | | | |
| <u>Subgroup 6</u> | | | 3 devices |
| ESD | 1020 | Testing not required for devices listed as class 3. Testing required for nonsensitive listing to prove capability. | |
| <u>Subgroup 8</u> | | | 45 devices c = 0 |
| Reverse stability | 1033 | Condition A | |

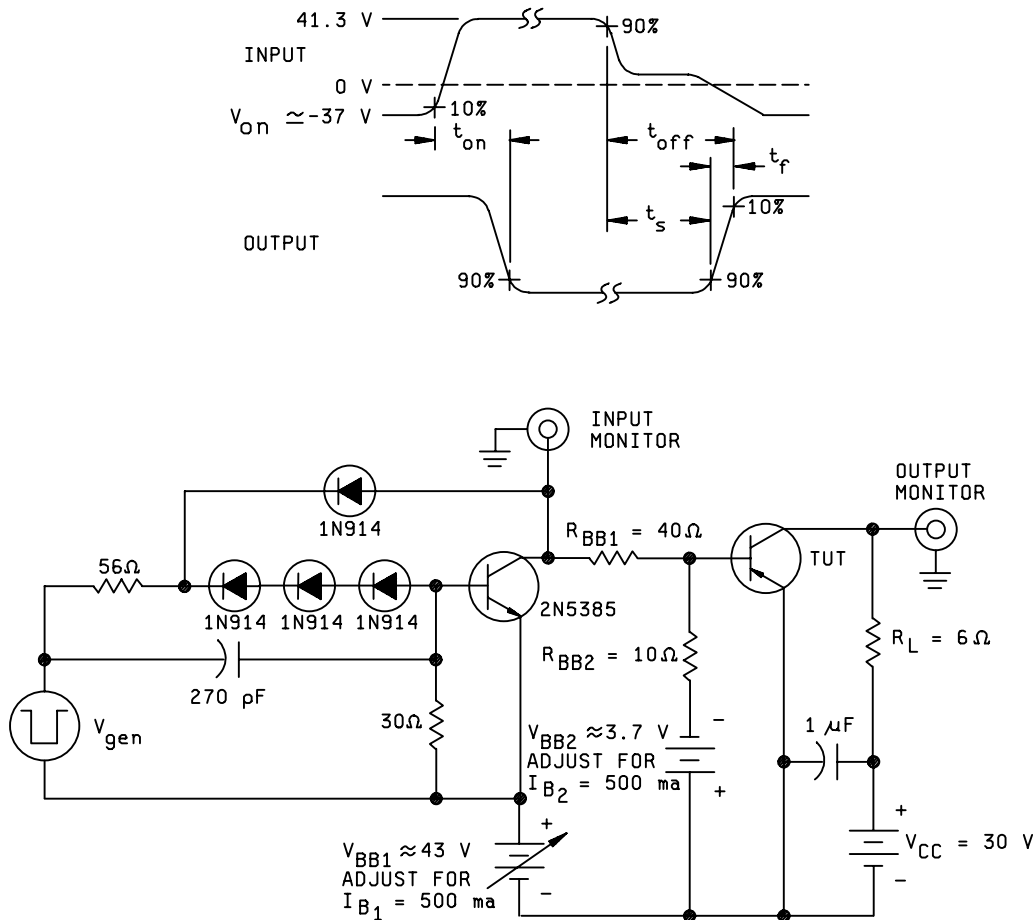
1/ A separate sample for each test shall be pulled.



* FIGURE 2. Maximum safe operating area.



* FIGURE 3. Unclamped inductive load energy test circuit.



NOTES:

1. V_{gen} is -30 pulse (from 0 V) into a 50 ohm termination.
2. The V_{gen} waveform is supplied by a generator with the following characteristics: $t_r \leq 15$ ns, $t_f = 15$ ns, $Z_{OUT} = 50$ ohm, duty cycle ≤ 2 percent.
3. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{IN} \geq 10$ M Ω , $C_{IN} \leq 11.5$ pF.
4. Resistors shall be noninductive types.
5. The dc power supplies may require additional bypassing in order to minimize ringing.

* FIGURE 4. Switching time test circuit.

5. PACKAGING

* 5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

* 6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Packaging requirements (see 5.1).

* c. Lead finish or formation (see 3.4.1).

d. Product assurance level and type designator.

* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil.

6.4 Interchangeability information. MIL-PRF-19500/612 is a TO-254 package version of MIL-PRF-19500/535, which is a TO-210 (TO-59) package version. The military 2N7372 contains the same die as the military 2N5005. The MIL-PRF-19500/612 is preferred over the MIL-PRF-19500/535 whenever interchangeability is not a problem. For new design use 2N7372. The 2N5005 is inactive for new design.

* 6.5 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - CR
Navy - EC
Air Force - 11
NASA - NA
DLA - CC

Preparing activity:

DLA - CC

(Project 5961-2957)

Review activities:

Army - AR, MI, SM
Navy - AS, MC
Air Force - 19, 99

* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil/> .